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AUTHOR Pollio, Howard R.
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ABSTRACT

This pamphlet discusses the use of questioning in the college classroom and its contribution to learning. Starting with a brief examination of the ways children question, discussions cover: (1) the effects of linguistic and socio-linguistic characteristics in questioning; (2) questions in psychotherapy, law, and opinion polling; (3) classroom questioning from kindergarten to college; and (4) questioning as performed by college lecturers. Analysis of questioning at the college instructor level indicates that instructor questions at all levels are more like those of a lawyer than of a scientist (or child). In these cases the answers are already known by the questioner, there is an air of power associated with them, and the questioner is the one who initiates, directs, evaluates, and controls the flow of things. Therefore, unlike the child, scientist, or scholar, these questions do not seek answers for advancement of knowledge but rather to focus on past knowledge. Such questioning, it is argued, limits learning by being more oriented to the past and the authority of the questioner than toward the future and the autonomy of the answerer. (Contains 41 references.) (GLR)

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No. 66 Spring 1989

ED 364 178

Teaching-Learning Issues

Any Questions, Please?

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This number of TEACHING/LEARNING ISSUES has been prepared by Howard R. Pollio, who is Distinguished Service Professor of Psychology and Research Associate at the Learning Research Center at the University of Tennessee, Knoxville.

You can not teach a man anything;
you can only help him to find it
within himself.

Galileo

Learning Research Center
The University of Tennessee, Knoxville

Rosencranz and Guildenstern appear as characters in two separate plays. In Shakespeare's *Hamlet*, they provide a background to the central drama that unfolds downstage concerning the royal house of Denmark. By a clever reversal of figure and ground, Tom Stoppard (in *Rosencranz & Guildenstern Are Dead*) places Rosencranz and Guildenstern in the foreground and Hamlet in the back. Despite this change, there is still the matter of what happened to Hamlet, his father, mother, uncle, and so on, but the action now unfolds from the joint perspectives of Rosencranz and Guildenstern who seem more like modern heroes than royal courtiers. Early in the first act the following dialogue occurs:

R: We could play at questions.

G: What good would that do?

R: Practice!

G: Statement! One-love.

R: Cheating!

G: How?

R: I hadn't started yet.

G: Statement. Two—love.

R: Are you counting that?

G: What?

R: Are you counting that?

G: Foul! No repetitions. Three—love. First game to...

R: I'm not going to play if you're going to be like that.

G: Whose serve?

R: Hah?

G: Foul! No grunts. Love—one.

R: Whose go?

G: Why?

R: Why not?

G: What for?

R: Foul! No synonyms! One-all.

G: What in God's name is going on?

R: Foul! No rhetoric. Two-one.

G: What does it all add up to?

R: Can't you guess?

G: Why do you ask?

R: Are you serious?

G: Was that rhetoric?

R: No.

G: Statement! Two-all. Game point.

R: What's the matter with you today?

G: Are you deaf?

R: Am I dead?

G: Yes or no?

R: Is there a choice?

G: Is there a God?

R: Foul! No non sequiturs, three—two, one game all.

G: (seriously) What's your name?

R: What's yours?

G: I asked you first.

R: Statement. One—love.

G: What's your name when you're at home?

R: What's yours?

G: When I'm at home?

R: Is it different at home?

G: What home?

R: Haven't you got one?

G: Why do you ask? ?

R: What are you driving at?

G: (with emphasis) What's your name?!

R: Repetition. Two—love. Match point to me.

G: (seizing him violently) WHO DO YOU THINK YOU ARE?

R: Rhetoric! Game and match! (Pause) Where's it going to end?

G: That's the question.

R: It's all questions.

G: Do you think it matters?

R: Doesn't it matter to you?

G: Why should it matter?

R: What does it matter why?

G: (teasing gently) Doesn't it matter why it matters?

R: (rounding on him) What's the matter with you?

(Pause.)

G: It doesn't matter.

R: (voice in the wilderness) What's the game?

G: What are the rules?

R: (explodes) Don't be stupid.

G: Sorry.

Rosencranz and Guildenstern go on questioning one another for a few more lines, but the essentials of how they question are apparent. Questions are a game, one (or both) keeps score of who is ahead, no real answers are forthcoming although significant issues are touched upon, an occasional summary keeps us (and them) abreast of what's going on, and we learn that asking questions continuously is difficult, unenlightening, and somewhat competitive. Even if we get nowhere new, it keeps us on our toes. Does this description bear any resem-

blance to the way questions are used in the college classroom? At the risk of having the score go to "one-love," the answer seems to be "yes," and ought make us wonder how our questions sometimes yield so little in the way of useful information.

Since Socrates, we all know that questions are at the heart of knowledge: We ask questions of our students to help them learn, to evaluate what they have learned, to test their reasoning, and to provide a springboard for discussion (Hyman, 1982). We also ask questions of ourselves and our world to help us uncover new information about our world and ourselves. Questions, however, appear in contexts other than the classroom or laboratory. In 1982, J.T. Dillon listed 15 different books—only one of which was more than 10 years old at the time—dealing with questioning from the perspective of 15 different disciplines including law, survey research, computers, linguistics, philosophy, anthropology, education, psychology, and library science. The breadth of disciplines covered by Dillon's list suggests that questions require a plurality of contexts to provide even a glimpse of their possibilities and modes of operation.

Developmental Concerns.

One context for discussing questions is that of the developing person, and Perry (1981) offers an interesting perspective on college students' changing concerns with questions. At the beginning of their studies, students tend to view the world as right or wrong, true or false. Over the course of a college career this either/or position is modified by experiences of multiplicity in which they come to recognize many different positions. A subsequent stage finds the student holding a more relativistic view that is both tolerant and more context-sensitive. At this stage, the student makes commitments in which the views of others are respected even if they entail different commitments. Knowledge is viewed as changing, and the student continuously evaluates and updates commitments as to which perspectives are true and valuable and which are not.

This bit of developmental history may be described in terms of social commitment and values as well as in terms of questions and answers. One reasonable reading of Perry's developmental schema is that at least half of the stages are characterized by answers: right answers, true answers, authoritative answers, provisional answers, contextual answers, contradictory answers, and so on. It is possible to render the progress of Perry's pilgrims as the movement from answers to questions or, more accurately, from questions requiring one type of answer early in their career to questions requiring a different type later on. Early questions are valued to the degree that their answers are authoritative and eternal; later questions are valued to the degree

that they encourage a plurality of answers.

Perry's analysis concerns college students; what do we know about the questions of children from the earliest beginnings of conversation through high school? For children age 2-6, questions have been observed to take up from as little as 11% of their conversations (Nice, 1920) to as much as 22% (Boyd, 1926). Some researchers (Stern, 1924; Hollingsworth, 1928) have defined two stages in the early questioning of children: the first concerning the names of things, and the second concerning the justification of commands and a desire to know when, how, why.

Davis (in 1932) analyzed over 3,600 questions asked by 73 children ages 3 to 12 as well as 500 questions asked by adults. One of her major findings was that 86% of the questions asked by children were asked of adults and only 13% of other children. Most questions (85%) concerned the immediate situation, and only a small number concerned more remote events. Novel events and topics were sometimes found to yield a special pattern of sequential questions. Looking at the records of all 73 children, Davis only confirmed what Rosencranz and Guildenstern suggested: The average length of a question sequence is 4+ questions, with some sequences containing as many as 14 or more questions. Although sequences may seem to wander about, adjacent questions usually tend to be conceptually related so that it would be wrong to characterize the child's questioning as asking for attention or lacking in self control. The child wants some topic covered, and questions are the means by which he or she does it.

The questions asked by Davis' children concerned fairly serious matters. There are questions, however, almost all children ask that are not serious, and these are called riddles. Something takes hold of the 7-9-year-old that compels him or her to riddle parents, teachers, and each other to death. Consider the following two gems (McGhee, 1979):

1. Why did the cookie cry?

   Because its mother had been a wafer so long.

2. Why did the farmer name his hog Ink?

   Because he kept running out of the pen.

Although much (or little) could be said about these riddles, they represent a valid (and mercifully brief) stage of child questioning. Riddles are part of the seven- to nine-year-old's developing interest in ambiguity and multiple categorization; they also suggest the child has mastered ordinary questions and now seeks to establish proper boundaries for how questions are, or may be, used. In a social sense, riddles mimic (and even ridicule) the centrality of question-asking in

elementary school.

Linguistic and Socio-linguistic Concerns

A second context for talking about questions concerns language, both in terms of how questions are asked and what their socio-personal implications might be. Within English there are three major ways to ask a question:

1. By a change in intonation: "You did go home?"

2. By a series of recognizable, but complicated, transformations: "Did John go home?"; "Has the boat left? Each question transforms a specific English statement: "John went home," "The boat has left."

3. By use of a wh-element. Wh-elements consist of words such as *what, who, where, when, which, why* and one h-word having similar pronunciation, *how*. (An additional minor question type involves the use of a tag ending: "He likes his job, doesn't he?")

Some questions are not questions at all but are better construed as suggestions, requests, or even polite commands. Consider the nominal question: "Could you please pass the salt?" Young children sometimes get confused and supply "Yes," but no salt. "Where are you going?" may mean "You do not have my permission to go," whereas "Don't you think it would be nice to send a thank-you note?" is a suggestion and not a question. These considerations yield the surprising generalization that not all questions request information even if they use the same grammatical machinery as information-seeking ones.

Such problems concern the form and meaning of questions. Answers also pose questions. In fact, one major way of categorizing questions concerns the type of answer expected. The most obvious requests a Yes/No answer: "Do you like steak?" A second category requests information: "When did Columbus discover America?" "What are the major types of questions that occur in English?" A final set of three, less frequent, answers may be defined by the or-question: "Do you want steak or chicken?"; the declarative question: "You mean, he didn't finish his homework?"; and the rhetorical question: "Is that a reason for despair?" "What difference does it make?" (All examples from Quirk, Greenbaum, Leech, and Svartvik, 1972).

Further questions about answers may be seen in terms of the seemingly innocent query "Who is that?" asked of a guest at a party. Many different answers are possible, especially if we assume the following all are true of the guest:

(a) Ronald Reagan
(b) The president
(e) Ron, Jr.'s father
(f) Gary Trudeau's friend

(c) Nancy's husband
(d) An ex-actor
(g) A senior citizen
(h) Jane Wyman's ex-husband

These are all good answers, and the obvious way we answer is not on the basis of logical possibility but what we, the answerer, assume to be the intent of the question. If the conversation is about occupations, (b) is the best answer; if it is about husband's, (c) is the best answer, and so on. (This analysis derived from French and MacClure, 1981.)

The same question often yields more than a single answer. Consider the set of questions posed by Fowler (1974) concerning *Brutus, killing,* and *a tyrant.*

(a) Did Brutus kill a tyrant?

(b) Did Brutus kill a tyrant?

(c) Did Brutus kill a tyrant?

(d) Did Brutus kill a tyrant?

Right now you are probably saying: "They're all the same question." In one sense yes; in another, no. Question (a) concerns whether or not Brutus killed a tyrant—in other words, the truth of the situation is at issue. Question (b) asks if Brutus did it, Question (c) asks if Brutus killed a tyrant or did he do something else to him, whereas Question (d) asks was it a tyrant Brutus killed. Each question makes sense on the basis of what the question is presumed to be about. A final way in which presuppositions and questions relate concerns the following (joke) question: "Have you stopped beating your husband yet?" This question presupposes you have a husband, that you beat your husband, and what is to be decided is whether you have stopped yet. A negative answer is ambiguous: It may mean I haven't stopped yet, or that I reject the question.

The important point to all of this analysis is that situational contexts, not logic, often decide what is a good and a bad answer. Questions are not context-free. There is a good deal of ambiguity to many questions and to assume that the question-as-asked is the same as the question-as-answered is not always correct. The significance of this fact is sometimes lost on parents, teachers, and other questioners. Not only is there not always a single answer; sometimes there may not even be a single question.

Wh-elements have an interesting history that might have some implications for how to use them in contemporary questioning. In old English, the wh-group had many members: the nominal form for both masculine and feminine was *hwa* and the neuter form was *hwaet*. In modern English these two have become *who* and *what*. Other modern forms include whose (*hwaes*), whom (*hwam*), and why (*hwy*) as well as *how* and *when*. Although it is not completely clear that the latter two

words have an identical history, most etymologies see them as deriving from *hwa*. What all of this means for contemporary question-asking is that each wh-word may be defined in terms of *what*. For example, *how* = in what way; *why* = for what purpose; *which* = what kind; *who* = what person; *when* = at what time. No other member of the wh-family seems so easily to cover all of the possibilities suggesting *what* (hwa) as the prototype wh-form in English.

Questions also have a clear social aspect. Going back to riddles, it is easy to see that the child who asks a riddle controls the conversation in an unfair way. This observation suggests that the person who asks a question is in a more powerful position than the person who answers it. Perhaps the major power relationships involving questions concern those between parents, teachers, and children. The data from a number of different studies (Mishler, 1978; Keenan, Schieffelin and Platt, 1978; Boggs, 1972; and Dillon, 1981) indicate differences in question-answer patterns between children and adults, children and children, and adults and children. If we take Mishler's studies as an example, the following conclusions seem justified: (a) Children's responses to adult questions are less complex than to those of other children; (b) how children answer the questions of other children depends on the location of the answer within the conversation; (c) there is little variation in the complexity of answers to adult questions regardless of where they occur in conversation. In commenting on these findings, Mishler (1975a) notes that "questions from persons with more power (adults) tend to constrain a child's response more so than a question from someone...equal in power. (Such differentials) overshadow the effects of linguistic contexts so that adult-child conversations show less variation across context."

Adults frequently question children but only rarely other adults. Sociolinguistic studies of caretaker speech (mothers, fathers, teachers, etc.) reveal that it consists largely of questions. Keenan et al. (1978) have interpreted this to mean that the basic function of caretaker questions is not to ask about something but to attract the child's attention toward some topic of interest to the caretaker: "Do you see the pretty toy over there?" Following this, the caretaker often asks a second question or provides information: "Did you know it belonged to my sister?"

In analyzing power relations more generally, Dillon (1981) notes that the Questioner (Q) assumes the right to ask a question of the Answerer (A). For A to ask a question, he or she must first show some deferential action: "*Excuse me*, could you show me how to do this?" If deference is not offered, either by word or deed, Q may refuse the change in status. A supervisor might halt a subordinate's question with: "Look I'm the one who asks questions around here." A peer

might stall a question with: "Why do you ask?" or "Who do you think you are, asking all these questions?" Subordinates, however, always answer questions posed by their boss.

Questions in Psychotherapy, Law and Opinion Polling

The fields of psychotherapy, law, and opinion polling use questions as one of their primary techniques. Who has not in movies or plays seen the brilliant resolving power of a single psychoanalytic or legal question, and who has not heard the relative merits of various polling techniques discussed in the media? Each of these professions uses questions in a different way and each has developed not only a specific style of questioning but a specific pattern of advice for the novice.

In law, the major locale in which questioning takes place is the courtroom and the major genre is cross-examination. When the witness tells a story in response to questions posed by his/her attorney, the probe is usually gentle: "Could you tell us (the court) what happened?" Cross-examination is where the fireworks take place, and a single volume seems to be the standard reference for over half a century—*Cross Examination* by Francis Wellman (1903/1974). Although a reading of this book yields a good deal of insight into the ways skillful lawyers conduct their inquiry, there are only a few bits of advice and most derive from the experiences and practices of the great cross-examiners: Be polite, get to the point, do not insult the witness, be fair in your questioning, etc. Perhaps the most unusual piece of advice given is never ask a question to which you do not already know the answer.

Psychotherapy also involves questions and answers, and many texts are concerned with the proper asking of questions. Much of the advice given depends on what is seen as desirable therapy. If the purpose is to promote personal exploration, few questions are asked and the burden of dialogue is on the patient. Too much questioning makes the patient dependent upon the therapist and the therapist's major role is to listen and ask for clarification only when necessary. In other types of therapy, the therapist continuously asks questions of the client in an attempt to reveal the implicit assumptions guiding (really, misguiding) the person. Still other therapies make use of a technique known as reflection in which the therapist summarizes what the patient has said and attempts to "reflect back" some non-obvious implication. Reflection often takes the form of simple question or statement: "How did you feel then?" "You must have felt angry." The most general question used in this approach is designed to offer the client a good deal of latitude in the answer: "Could you tell me more about that?"

The major impression that comes from examining the ways in which therapists are advised to use questions is that questions are viewed as directing the flow of dialogue in a powerful way. If handled skillfully they enable the person to examine unexamined suppositions; if unskillfully used the therapist runs the risk of directing the client to a far greater degree than is desirable. Frequent questions may make the patient into a passive answerer who simply does his/her job and never goes more deeply into an issue unless asked. The therapist who supplies answers to his or her questions further confines the patient; such a situation seems relatively restricted to student therapists early in training.

Although the issue of when and how to question in psychotherapy depends upon what the therapist is trying to accomplish, all therapists are clear on two pieces of advice: Do not interrogate as a lawyer does (what one therapist called bombarding the client) and try not to ask why-questions. Although reasons for the first piece of advice seem clear, why not ask why seems less clear. The major reasons for not asking why-questions are that they tend to lead the person away from describing direct experience and tend to request them to provide an explanation. Why-questions often are experienced as connoting disapproval. Most of us have grown up in an environment in which "why" implies blame or condemnation, and we respond in the present as we have in the past.

A final locale in which questioning takes place concerns questionnaires and poll-taking. Anyone who has ever received a badly worded questionnaire knows how trivial and time-wasting such surveys can be, and the professional pollster is sensitive to making questions easy to answer, non-leading, and small in number. There are a great many manuals available for providing a good set of questions—not to mention complete courses in survey design and analysis—and the advice given to the would-be question-writer is simple: Help the respondent understand your question and make sure the answer reflects his or her opinion. Almost all technical advice concerns matters such as wording, question sequence, rapport building, question-setting, and so on.

What stands out most clearly is that this situation is different from many of those considered earlier (except, perhaps, the courtroom) since it involves questions asked by strangers of strangers. It is quite one thing for a therapist to help you talk about your job or intimate life; it is quite another thing for an anonymous interviewer to ask you about similar concerns. Most of the advice deriving from the polling or questionnaire approach seems to have come about because of the special nature of the relationship between questioner and answerer. While the role of social context is significant whenever a

question is asked, its significance is greatest where the interpersonal relationship is least. Hence, more concern needs to be given to the specifics of a question and its place in a sequence of questions by the lawyer and the pollster than by the therapist or parent. Where the conversation is not between strangers, the relationship is at least as important as the question. Such influence may facilitate or interfere with the way a question is understood and answered; it is never irrelevant.

Classroom Questions from Kindergarten to College

Questions occur in two specific classroom activities: during day-to-day interactions and in that special context known as a test. The use of test questions relates to their role in more day-to-day conversations because they reinforce the teacher's power *vis à vis* the student and because they serve to remind the student the classroom is an evaluative context. Although conversational questions may not have either of these purposes explicitly, the fact that tests and grades are a significant part of the classroom must be taken into account in attempting to understand what questions mean to students over and above their information-seeking intent. Since power and evaluation are aspects of the everyday world of the classroom, the use of questions as a testing device only serves to emphasize the evaluative aspects of ordinary question-answer sequences.

In her analysis of what goes on in the pre-college classroom, Cazden (1986) surveyed a good deal of work on the role teacher questions play in shaping conversations between students and their teachers. She begins by noting, as have many others, that the teacher does the majority of speaking, sometimes as much as 80%. Of this total, about 25% is questions; as a point of comparison, less than 2% consists of praise, and 30-50% consist of what properly could be termed lecturing.

A major component of classroom interaction is called the recitation, and consists of a teacher asking a question and of a student answering that question. The first description of this pattern was made by Stevens as long ago as 1912. Stevens' results were clear in showing that once the recitation was underway, teacher questions occurred at a rate of about two or three per minute. This fact led Steven's to a number of conclusions concerning classroom questions:

1. A high-strung nervous tension is maintained for a considerable period of time;

2. The teacher does most of the work instead of directing pupils to do the thinking;

3. The greatest educational assets to be derived from such a pattern are rote memory and superficial judgment; and

4. Little thought is given to the needs of individuals students; the teacher sets the pace and pupils follow as a body or drop by the wayside.

Recent work confirms the high rate of questions per day. Stevens found 395 questions per school day for high school teachers; in 1960, Floyd found 340 per day for primary school teachers. These rates have held up over the intervening years, and it seems a reasonably secure fact that during recitation teachers ask two to three questions per minute. Because of this, a number of researchers have attempted to develop a taxonomy of teacher questions. Such taxonomies are usually based on Bloom's taxonomy of educational objectives which is composed of categories such as factual knowledge, analysis, evaluation, synthesis, application, and comprehension. These categories refer to the way in which the teacher (or some rater) construes a question; they do not necessarily define the way in which the student deals with the question. For example, if the instructor asks "What are some of the differences between associationistic and cognitive theories of mind?," the question may have been meant to stimulate analysis and evaluation. Since some texts print a list of such differences in the form of a table, it is possible for students to answer on the basis of straight recall: The question answered is not necessarily the same as the question asked.

An early review of teacher questions noted that about 60% were designed to recall facts, 20% required students to think, and 20% were concerned with procedural matters. These data suggest that for at least 75 years, classroom questions have been concerned largely with the recall of facts. Although a number of explanations have been offered for this state of affairs, it seems that in terms of questions asked, teachers view learning as the piling up of more and more facts. This situation prevails despite the long-term advice of educational "mayvens" that critical thinking is the most desirable outcome of classroom instruction. An examination of teacher questions, rather than educational rhetoric, reveals that the educational system promotes the recall of facts as a major educational outcome, all protestations to the contrary.

Teachers are not the only ones who ask questions; so, too, do students. One early analysis of question-asking at The University of Wisconsin laboratory school by Corey (1940) noted that in 36 hours of observation, teachers asked 1,260 questions to 114 for the students. Even though we might expect some disparity (teachers do talk over 65% of the time), the better than 10-to-1 ratio seems a bit lopsided. Other estimates (Gall, 1970) reveal that in high school classrooms students accounted for 1% of the questions, in junior high school

science classrooms about 14%, and in elementary classroom about 4%. As far back as 1940, Corey mused on these findings: "why (do) mature persons (the teachers) have to ask immature persons (the pupils) so many questions. There is some basis for expecting the teachers to be the answerers, Socrates notwithstanding (p.752)."

These studies are largely demographic. More recent studies have been concerned with describing the micro-structure of the question-answer sequence (Rowe, 1974a; 1974b; Mishler, 1975a; 1975b). In Rowe's studies, tape recordings of over 300 elementary science classes were analyzed and patterns of teacher-student interactions evaluated. The basic result indicated that teacher wait-time—the amount of time a teacher waited after asking a question—was a critical factor dictating whether, and if, a student responded to the question. Results indicate that teachers wait an average of about 1 second before they repeat, reemphasize, or ask a different question. Once the student responds, a second wait time follows the answer. Usually, this post-answer wait time averaged 0.9 of a second.

Using these studies as a guide, Rowe (1974a; 1974b) trained teachers to wait 3-5 seconds during the period following the question and its answer. Results were clear:

1. length of answer increased
2. number of unsolicited, but applicable, responses increased
3. number of failures to answer decreased
4. number of speculative responses increased
5. number of student attempts at analysis and evaluation increased
6. number of student questions increased, and
7. amount of student-student conversations increased.

There also were some clear changes in teacher questioning. Among the more noteworthy were a not surprising decrease in the rate of questions, an increase in the variety of question-types asked and a correlated decrease in the number of requests for information, a change from the rapid-fire inquisition pattern of question-asking to one having a more conversational/discussion quality, and a change in the teacher's expectancy regarding students previously rated as at "the bottom of the class."

When speculating on her results, Rowe wondered if these effects came about because of a shift in emphasis away from control by the teacher to one emphasizing intellectual activity by the student. In the ordinary classroom, short pauses and many questions allow the teacher a degree of control that is sharply decreased by allowing the student more time to answer a smaller number of questions, espe-

cially if such questions require higher order thinking. Rowe's results provide one way out of the 75-year-old bind of using rapid-fire questions for purposes of control and testing rather than for encouraging students to think.

One further aspect of the question-answer game concerns the issue of whether higher-order questions promote higher student achievement than those asking for the recall or recognition of facts. The obvious expectation is that higher-order questions stimulate higher order mental processes and, by implication, greater student learning. Although an early review by Gall (1970) found support for this conclusion, a study-by-study analysis of 18 different studies (Winne, 1979) revealed that 60% showed no difference in achievement, 25% showed an opposite effect (fact-questions led to higher scores than higher order questions), and only 15% found higher order questions leading to higher achievement. Such results led Winne to conclude "that whether teachers use predominately higher cognitive questions or predominately fact questions makes little difference in student achievement."

A reanalysis of many of the same studies by Redfeld and Rousseau (1981) came to a more sanguine conclusion. When studies were evaluated on the basis of whether they assessed accurately the differential level of teacher questioning (higher order vs. fact) and whether they employed a quantitative measure of achievement, results did reveal higher order questions led to higher achievement. In fact, use of a sophisticated statistical analysis led the authors to conclude that the average "student could be expected to score at the 77th percentile after...(being exposed) to higher order questions as opposed to the 50th percentile...if not so treated."

A final aspect of teacher questions concerns the relationship of questioning to classroom discussion. In a series of two papers, Dillon (1981a; 1981b) has analyzed this relationship and comes to a single powerful recommendation: In leading a discussion, only ask a question when you are personally perplexed and need or want information. Although Dillon allows questions to play other minor roles in a discussion—to define an issue for discussion, to ensure you have heard what someone has said, and to regain control of the class—the overriding maxim is clear: Once a topic has been set, shut up unless you really want to know something.

Table 1 offers a summary of Dillon's views including advice on when to question, when not to question, and alternatives to questioning. Each of the 10 suggestions on when "Not to Question" relates to the ordinary classroom use of questions. If we consider recommendations 1 and 2, it is possible to see that prior research reveals this as the most usual pattern: ask a question, get an answer, ask another

Table 1
Questioning and Non-questioning Techniques in Discussion

To Question	Not to Question	Alternatives to Questioning
1. when you personally are perplexed & need the information **Procedural uses** 2. to define the issue for discussion, e.g., at the start to pose the question or at mid-point to clarify the question. 3. to ensure hearing rightly, e.g., "I'm sorry, what did you say?" 4. to regain control of the class when things get out of hand.	1. at your every or every other turn at talk. 2. when a student pauses, falters, or has ostensibly finished speaking. 3. in an attempt to "draw out" an individual student who is "not participating." 4. in an attempt to probe or find out the feelings & other personal involvement of a student. 5. in order to "make a point." 6. in reply to a student's question. 7. in an attempt to elicit from a student the (prequestion) thought which has occurred to your mind. 8. by means of a why-question. 9. at the start of the discussion or near the beginning of a course. 10. in hopes of stimulating student thought & discussion.	1. declarative statement—express your own state of mind, thought, opinion, etc. 2. reflective restatement—summarize your understanding of what the speaker has said. 3. declaration of perplexity—if perplexed, inform the student by a mixed declarative-interrogative phrasing (c.f. indirect question). 4. invitation to elaborate—if wishing to hear more, invite the student by a mixed declarative-imperative). 5. class questions—invite or permit students to raise a question about a classmate's contribution, or on the issue at hand. 6. speaker's question—when a student has confusion or difficulty making self understood, encourage that speaker to formulate a question. 7. deliberate silence—say nothing but maintain an attentive silence for 3-5 seconds (perhaps murmuring or nodding) until the original speaker resumes or another student enters in.

question, and so on. Many of the remaining points also define standard aspects of classroom questioning practice, which, at times, may be described as interrogation rather than questioning. Since questioning may legitimately have an evaluative function (does the student know this piece of information), it is clear such a focus may inhibit discussion. When questions are meant to provoke a discussion, the number of questions should be sharply curtailed.

Dillon's point is that questions define a somewhat tense and unequal relationship between teacher and student. For the discussion to succeed, a more reciprocal power relationship is necessary and the instructor must change from evaluator to facilitator. Each alternative to questioning is designed to reduce the instructor's role in directing the discussion and to place responsibility for thinking/learning squarely in the collective lap of the students. Contrary to widespread pedagogical practice, the use of questions does not facilitate discussion and may actively inhibit it.

The Questioning of College Lecturers

Much of the research on teacher questions has been conducted in pre-college classrooms and very little in the university lecture hall. To provide data on professorial modes of questioning, six undergraduate students were set loose in college lecture classes at the University of Tennessee, Knoxville, and were asked to tape-record one or more lectures. Some students recorded all 50 (or 75) minutes of a single lecture; others recorded 10 minutes of five different lectures of the same instructor. This latter strategy was designed to sample more than one lecture by a single professor and to determine if there are systematic differences in questions according to where in the lecture they occurred.

Whole lectures by a single professor also were recorded to determine if individual lecturers yield the same pattern as those derived across different lecturers. To examine consistencies over class periods, two lecturers were recorded on more than a single occasion. The specific lecturers chosen for multiple observation were the ones who had produced the largest and the smallest number of questions per lecture. In all, 550 lecture hours from 10 different classes were recorded and analyzed. Of these classes, five were in the social sciences, two in the humanities, and three in the arts. Five of the classes were recorded for 10 minutes on five separate occasions and five were recorded continuously for a complete lecture. Since one of the classes yielded no questions during the first 50-minute period, it was observed again and once more the instructor did not ask a single question. One of the lecturers, who asked 50 questions during the first observational period, was observed a second time during which time

44 questions were asked. To determine if a similar high rate would describe a third session, an additional hour was observed during which time this instructor asked 24 questions.

Two caveats must be made explicit before getting to numbers and graphs. First, only a small number of instructors, teaching a small number of disciplines, using largely a lecture format, were observed; and second, over 35% of the questions required a Yes/No answer and, while 12% of these were audibly answered on tape, the possibility exists that some answers were signaled in the classroom by a nod of the head or some other non-verbal gesture. The numbers that follow, while looking for all the world as if they were honest and true, may, in fact, neither be quite so honest nor quite so true. They are meant to describe present findings: They are not the last word on the topic of college questions.

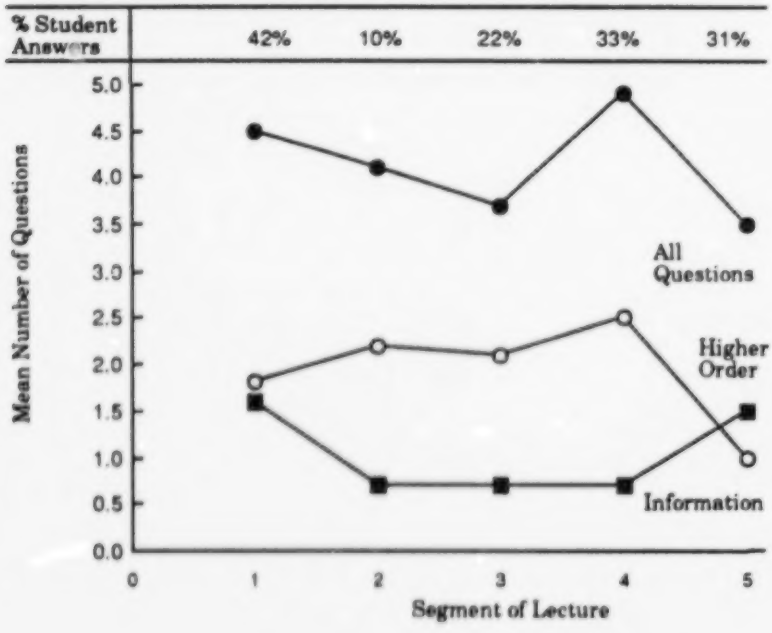
Over all 10 classes, the mean number of questions asked per 50 minutes (longer classes were pro-rated to a 50-minute base) was 21.3, with specific values for individual instructors ranging from 50 to 0. The value of 21 per 50 minutes yields a rate of about one question every 2.5 minutes, a value considerably lower than that reported for elementary school classes. This result is not surprising since most pre-college teaching takes the form of question-and-answer recitations and present observations were recorded from reasonably large lecture classes (50 or more students).

Where did questions take place during the lectures and what proportion were answered by students? Figure 1 presents the mean number of questions asked during each of the five periods into which lectures were divided. Results also are presented according to whether the question was coded as one requesting information or some higher order process such as analysis, evaluation, or opinion. The top row provides the percentage of student answers to questions asked during each period.

A first result of interest concerns the fact that students never answered more than 42% of the questions asked (during period 1) and sometimes (during period 2) only 10% of the questions asked. The overall value was equal to about 31%, indicating that 69% of the questions asked were not answered by students (see the caveat about Yes/No answers described above). What happens to such questions depends on the instructor; some answered them themselves; others let them hang, like dying balloons, and then continued on with the lecture. Students do answer some questions, however, with the highest proportion occurring during the first fifth of the lecture. Questions during periods 2 and 3 yielded the lowest percentages whereas questions in the last two periods showed an increase in student answers.

Pre-college studies of questions have concerned the type of question asked. An examination of questions asked in college lectures revealed that while information and higher order are relevant categories, it was also necessary to consider rhetorical and procedural ones. Procedural questions were scored whenever the lecturer asked about the lecture—"Did you get that?" or about other aspects of the class-situation "Should we close the window?" When questions were coded into these four categories, 54% asked for the recall of information, 10% were rhetorical, 10% dealt with procedural matters, and 26% required higher order answers. Whether we respond to these figures with appreciation or dismay, it seems clear that only one question in four required the student to perform a higher order intellectual task, whereas one question in two asked for the straight recall of factual information. Of the 26% asking for higher-order analysis, about half

Figure 1: Type of Question Asked and Percentage of Student Response During Various Lecture Segments



asked for a statement of opinion: "Did you like the story (musical piece)?"

An examination of where and when information and higher order questions were asked revealed clear differences. Information questions began at about 1.8 in period 1, roughly the first 10 min. of the lecture, and reached their highest value of about 2.8 in period 4. Following this, they declined to their lowest level (1.1) during period 5. Higher order questions were equal in number to information questions during the first and fifth periods, but occurred less frequently in periods 2, 3, and 4. Procedural and rhetorical questions (not presented in Figure 1) had reasonably constant (and low) rates across all five periods.

If we combine results of student answering with those of teacher questioning, we note that student response is higher where both information and higher-order questions are asked about equally often. Exactly what this means is difficult to interpret since the first and last periods of any activity are known to have special motivational properties, and the best that can be said is that teachers and students show primacy and finality effects. One thing that does seem clear, however, is that even though instructors ask a good number of information questions during periods 2 and 3, both the number of higher-order questions and the rate of student response decreases during these periods. Perhaps both students and teachers are responding to the low-motivation middle of the lecture—the instructor by asking more (information) questions and the student by laying back a bit more than in the first (and last) period.

One further point about higher order questions: During period 1 such questions requested analysis or evaluation; during period 5 they asked for opinion on material covered during the lecture. On the basis of the type of question asked, it is possible to view the opening round of questions as concerned with reviewing old material (information) or with attempting to motivate new material (evaluation and analysis). Once the job of motivation or review is complete, the number of questions decreases slightly as the more-informational aspects of the lecture continue. By period 4, much of the day's content has been presented, and the lecturer now uses questions as a way of determining what has been learned. The final period is concerned with a wrap-up, and information questions reach their lowest level at this point. The increase in higher order (opinion) questions seems congruent with this view as the lecturer attempts to enable the student to come to a personal evaluation of today's material.

The amount of time a questioner waits following a question has been found to be an important factor affecting whether a question gets answered. For this group of lecturers, the average post-question

pause was 1.55 seconds. Individual differences were striking: One instructor had an average wait time of .77 sec., another of almost 3.0 seconds. Contrary to expectation, results for these two extreme individuals indicated that students answered 43% of the non-rhetorical questions posed by the first instructor and only 8% of those posed by the second instructor. When values for the remaining lecturers were evaluated, the usual relationship of pause time to answering appeared, with instructors waiting the longest time (2.8 and 2.4 seconds) getting the greatest percentage of answers (58% and 48%, respectively) and with instructors waiting the shortest time (1.2 and 1.0 seconds) getting the smallest percentages of answers (29% and 18%, respectively). With the exception of one very fast and one slower paced instructor (speech rates gave a similar picture of the two lecturers) the usual relationship of wait time to student answers appeared in these data.

When present results are compared with the small number of prior studies concerned with questions in college and university classrooms (Dunkin and Barnes, 1986; Ellner and Barnes, 1983), a number of similarities appear. When averages were calculated by Dunkin and Barnes from six different studies of college teacher questioning, results indicated that 61% of question were coded as requesting the simple recall of information and 27% as requiring higher order skills. When the relative percentage of lower-to-higher-order questions was examined on a discipline by discipline basis—something not done in the present analysis—results indicated that courses in the arts/humanities/social sciences (the disciplines observed at the University of Tennessee, Knoxville) had a lower proportion of recall questions than courses in mathematics, engineering, and natural science. One set of investigations at the University of Iowa (Kyle, Penick and Shymansky, 1980) found that laboratory courses in chemistry and physics had a higher proportion of recall questions than did laboratory courses in botany, geology, or zoology. In regard to wait time, Andrews (1980) found no difference in wait time (the general average being about 1.5 seconds) following higher and lower order questions, although longer student answers did follow higher order questions.

Since questions may be asked in terms of a number of different linguistic constructions, an examination of professorial questions was made in terms of linguistic form. By far and away the majority of questions used either a wh-element (54%) or a linguistic transformation (38%); only 6% involved a rising inflection and 2% were tag questions. In terms of answers, the majority (56%) requested a statement although 35% could be answered by a simple Yes or No. An additional 9 percent, while cast in Yes/No terms, seemed to request

further elaboration in the form of a sentence; "Yes, but it really works like this." When questions were cross-tabulated in terms of question-and-answer type, the resulting data revealed an almost perfect relationship between transformational questions and Yes/No answers and between wh-questions and statement answers. Only 3 of the 115 wh-questions requested a Yes/No answer, and only 3 of the 79 transformational questions requested a phrase or sentence as their answer. One further analysis concerned the relationship between linguistic question type (Wh, transformation, tag, and inflection) and cognitive question type (information, higher-order, procedural, and rhetorical). Considering only the major categories of wh-element and transformation, results were clear in showing that information questions were largely asked in a wh-format (72%), that higher order questions split about 50/50 between wh- and transformational formats, that procedural questions used the transformational format in over 75% of the cases, and that rhetorical questions split 50/50 between wh- and transformational formats. When instructors ask for information, they ask "when," "where," "why," "what," and "how;" when they ask for advice on how things are going or what to do next, they use a transformation pattern—"Do you all understand that?" "Should we close the window?"

How did the type of questions relate to whether students did or did not answer? At the simplest level, results indicated that students answered 35% of information questions and 31% of higher order questions—not much of a difference. When questions were coded in terms of linguistic form, results revealed students answered 41% of wh-questions set to them, and only 16% of transformational questions. When the answer type required by the question was evaluated, 40% of the questions requesting a phrase or sentence yielded student answers; only 12% requiring a simple Yes/No yielded an answer. These percentages are all in the same ballpark as those reported by other investigations such as Ellner and Barnes (1983) and Dunkin and Barnes (1986), all of whom reported values ranging between 20% and 48%.

These analyses yield a fairly straightforward set of rules for getting a student to answer a question: Ask a wh-question, requesting information or evaluation during the first or last 10 minutes of the lecture, and then wait. For instructors with a rapid-paced delivery, the wait time may be brief; for more leisurely paced instructors, two to three seconds seems a good general recommendation. Finally, the instructor should not be distressed if a question goes unanswered; even the very best of instructors—best in terms of getting answers from students—produces only a 50% hit rate. For the majority of college lecturers, students answer only about 30% of the lecture

questions asked, and we tend to answer the majority of those remaining by ourselves.

A Small Summary and A Question or Two

An extremely revealing description of educational questioning has been provided by Dillon (1981), and we could do no better in closing than to half-quote, half-paraphrase his description. To begin: The typical classroom has one person in control of the discourse of many. Typically the instructor speaks more than anyone else, and frequently in questions. Students usually speak in answers and discourse proceeds by a series of exchanges between the instructor and one or many students. Students usually do not speak to one another and rarely ask questions (and, then, primarily of the teacher). Teacher questions are not asked for the sake of discovering information since the information is known to the teacher and sometimes to the student. When the student responds, answers typically are brief and simple, and usually require a knowledge of factual material of a conventional type. Immediately following the response, the teacher speaks again, sometimes noting the answer. For the student answering questions, the situation is tense and somewhat unpleasant, and this is particularly true where questioning is prolonged and the outcome uncertain (i.e., as in a recitation).

The extremely stark nature of Dillon's description suggests that instructor questions at all levels of the educational enterprise are more like those of a lawyer than of a scientist (or child). The questioner almost always either knows the answer or has some strong notions as to how the question should be answered. More often than not the question does not attempt to elicit new or unknown information but to evaluate, test, or control the conversation (and the person questioned). Questions have an air of power and control about them, and the instructor is the one who initiates, directs, evaluates, and controls the flow of things. Although present data do not deal with the issue, it does seem as if the student's major experience with questions is that they always have a correct answer that somebody (higher up?/ smarter?) knows and will evaluate as correct or not.

Classroom questions are vastly different from those of the child, the scientist (or scholar), and some students at the end of their college careers. For all three groups, the question—the quest—is focal, not its answer. The child wants to know what a thing is called, how it works, why it works, and so on; so, too, do the scientist and scholar. While there always are answers to be built upon, there must also always be awe and wonder in the face of an unknown event, object, or idea. The quest is what moves thinking forward; and while knowledge always depends upon a foundation of prior knowledge, the

privileged domain of the scholar, the scientist, and the child is future and not past knowledge.

The use of questions throughout the educational system seems more oriented to the past and the authority of the questioner than toward the future and the autonomy of the answerer. Such a state of affairs must lead those of us who teach to wonder if we are dealing only in a limited use of questioning: that of power, control, authority, and past knowledge. While questions of this type are reasonable and necessary, should we also not try to model a more open use of questions in which we truly seek a new answer rather than one already known? Questions, asked in the present, open time in two directions: what we as a culture already know and what we hope to know. As Susanne Langer (1957) noted long ago, the generative questions of one or another intellectual era define it more precisely than the answers it provides, primarily because such questions imply the direction of their answers as well as what will count as admissible evidence.

Questions are a ubiquitous aspect of the teaching/learning environment: Can we as questioners do any less than question seriously the epistemological, pedagogic, and personal implications of the 20 or more questions we ask each and every lecture hour? To do less would be to undermine one of the very purposes we seek to serve: to encourage and promote the questions by which our intellectual era will be known and judged by future generations of scholars and their students.

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W. Lee Humphreys, Director
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